

No Privacy in Monopoly?

An Economic Perspective on Social Network Services and Data-Centric Business

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Abstract

This paper draws up a multi-disciplinary research agenda towards further investigation of the interrelation of market structure and the privacy problems in Social Network Services and Data-Centric Business. Specifically, this paper analyses indicators from current research and media observations in order to elicit hypothesis regarding the interconnection of market structure and privacy problems in those markets. On the one hand, this paper discusses whether the users' side of the multi-sided markets in data-centric business is the disadvantaged or even overpriced side in comparison to the advertisers' side, in that considering the disclosure of personal data a form of payment. On the other hand, a discussion of the relationship of market structure and providers' potential incentives for following privacy-undermining strategies in order to strengthen their position on the advertisers' side of the market is provided. Building upon these considerations, the presented research agenda proposes open research questions regarding the feasibility and implications of interventions in the market structure.

1. Is it the Market Structure?

Most Social Network Operators (SNOs) follow a data-centric business model (Müller, 2012), i.e., for generating revenue, those providers rely almost exclusively on targeted advertising (Enders et al., 2008). Hence, they require precise user profiles in order to match advertisements to users. Consequently, SNOs, and data-centric businesses (DCBs) in general, design their services in ways that incite their users to disclose personal data (Acquisti and Gross, 2006). In the majority of cases, the amount of personal data that users disclose in Social Network Services (SNSs) by far exceeds (1) the amount of data necessary to use the service or a specific functionality of the service and (2) the amount of data that users initially intended to disclose (Nolte, 2015; Stutzman et al., 2013). The latter, in particular, often goes unnoticed by users, as observation of their behavior within a SNS alone is often sufficient to derive personal information about them (Pennacchiotti and Popescu, 2011; Kosinski et al., 2013). Obviously, this poses a severe threat to users' privacy.

From an economic perspective, SNOs constitute multi-sided platforms catering to SNS users on the one hand, and to advertisers on the other hand, while creating a network effect between both sides (Müller, 2012; Nolte, 2015). Studies on traditional multi-sided platforms show that, in the majority of cases, there exists a highly competitive market side that is subsidized, and a less competitive market side that is overpriced by the platform providers (Kaiser and Wright, 2006). The SNS market structure suggests that this constellation can also be found in the SNS

market. The competition on the advertising side of the market seems high, while users suffer from lock-in effects and high switching cost when trying to switch between SNSs. The current market structure suggests the assumption that SNOs tend to establish monopolistic positions on the users-side once they have reached a critical mass (see Section 3).

Leading economists agree that monopolies have to be observed and controlled by public policy to guarantee that market participants in a monopoly or quasi-monopoly situation do not abuse their position to hamper innovation and growth, manipulate markets or guarantee themselves a large head start in next-generation markets (DeLong and Summers, 2001). Recent actions of the European Union versus Google to guarantee search neutrality illustrate policy attempts to control such a quasi-monopolistic market participant. The accusation against Google is that it abuses its quasi-monopolistic position in the search engine market to give their products (e.g., YouTube, GoogleMail) a large head start via their own search engine service. Other, non-governmental actions like “Europe versus Facebook”¹ show that also civil-rights activist critically observe the market behavior of dominant SNSs like Facebook and suspect the misuse of market power.

Upon this consideration, this paper draws up a multi-disciplinary research agenda towards further investigation of the interrelation of market structure in data-centric business and the privacy problems in this business. Specifically, this paper analyses indicators from current research and media observations in order to elicit hypothesis regarding the interconnection of market structure and the privacy problems in SNS business. On the one hand, this paper discusses whether the users’ side of the two-sided SNS market is the disadvantaged or even overpriced side compared to the advertisers’ side, in that considering the disclosure of private data a form of payment. On the other hand, a discussion on the relationship of market structure and SNOs’ potential incentives for following privacy-undermining strategies in order to strengthen their position on the advertising-side of the market is provided.

Building upon these considerations, the presented research agenda illustrates open research questions regarding the feasibility and implications of intervention in the market structure. In particular, is it to be investigated whether intervention could lead to privacy becoming a more relevant competitive factor and, lastly, to a better market equilibrium and, thus, increased welfare. This includes analysis of the current market structure in SNS business, as well as of regulatory and technological means to achieve shifts in this market structure. In particular, the presented research agenda proposes to investigate the potential effects of technological means to increase SNS users’ movability between different SNSs.

Therefore, we give an overview over related work in the area of data-centric services, multi-sided platforms and SNS user behavior in Section 2 to build the foundation for the following parts. Further, in Section 3, we present a first approach to explain the SNS market structure from an outside view in a macro-economic perspective and form an inside analysis with a micro-economic network-effect model. Moreover, first data evidence for the quasi-monopoly thesis will be given. Build upon this, in Section 4 a multi-disciplinary research agenda will be presented to target the questions of quasi-monopoly in the SNS market and how to improve user privacy or even counteracting the monopoly tendencies with instruments such as moveability, transparency and accountability. Finally, we conclude this paper and provide an outlook on future work in Section 5.

2. Background and Related Work

In the following, we first provide an overview on data-centric business and the definitions underlying our analysis. We further provide an overview over related work in Section 2.2.

¹ <http://www.europe-v-facebook.org>

2.1. Data-Centric Business and Privacy

The majority of SNOs follow a DCB model as defined by Müller et al. A schematic representation of the data-centric business model is depicted in Figure 1. DCBs offer their services for free and rely on brokerage of targeted advertising in order to generate revenue (Müller et al., 2012). Hence, this business model builds upon profiling of service users in order to generate precise targeting profiles, which constitute the foundation for targeted advertising.

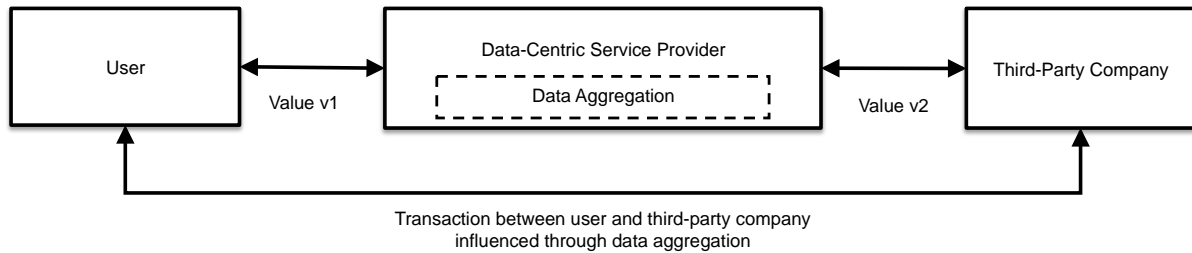


Figure 1 Schematic representation of data-centric business (taken from REF)

While we aim at investigating the interrelation of the market structure in data-centric business and privacy in general, in this paper we focus primarily on the special case of Social Network Services. We do, however, also consider the market for Internet search where necessary to illustrate central concepts of our investigation. To delimit Social Network Service (SNS) business against the more general Data-Centric Service (DCS) we resort to the following definition of SNSs as “web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system and (4) allow users to communicate over the Internet as well as to share interests, media, and activities,” (Boyd and Ellison, 2007, p. 211). Moreover, we define the already introduced term of the Social Network Operator (SNO) as operators, which “provide the underlying basic services and infrastructures, needed by users to interact with each other” (Buchmann, 2012, p. 25). For the example of Facebook, the website facebook.com is the SNS and the company Facebook itself is the SNO.

The privacy definition we use in this paper builds upon Westin’s definition of privacy. Westin defines privacy as “the claim of individuals, groups or institutions to determine for themselves when, how, and to what extent information about them is communicated to others (Westin, 1967, p. 7). For him, “[t]his, also, involves when such information will be obtained and what uses will be made of it by others” (Westin 2003, p. 431). In the context of SNSs, we abuse language and consider privacy the capability of SNS users to control their personal data and its collection, aggregation, and analysis by the SNO, as well as SNS users’ ability to optimize the amount of this data, and its security against misuse with respect to their preferences.

For the definition of personal data we use a broad scope and draw from Nolte who defines personal data as “any data revealed by user action, starting from simple likes, to direct personal information, and even analysis of users click and browse behavior” (Nolte, 2015).

Given these definitions, it is obvious that the above described data-centric business model poses severe threats to users’ privacy.

2.2. Related Work

While the interrelation of market structure in DCS, respectively SNS, and privacy has not been subject to research yet, the more general question whether there actually exist tendencies

towards monopoly or actual monopolists in data-centric business and two-sided markets has been addressed from different angles.

The economics of two-sided markets have most notably been explored by Rochet and Tirole (Rochet and Tirole, 2003). Further research into competition in two-sided markets has been conducted by Evans and Schmalensee, Armstrong or Hagiu and Wright (Armstrong, 2006; Evans and Schmalensee, 2013; Hagiu and Wright, 2011). While these highly recognized works provide deep insight into the economics of two-sided markets they are not concerned with privacy issues.

A variety of publications address the question of monopolistic tendencies in data-centric business, in that focusing on the search engine market and Google's market position in particular (Giacomo, 2013; Haucap and Kehder, 2013; Haucap and Kehder, 2014; Kühling and Gauß, 2007; Bork and Sidak, 2012). However, the potential interrelation of the privacy problems in data-centric business and the market structure in Internet search, let alone SNS, are not in the focus of current research.

3. Monopoly and Competition - two sides of the same coin

In the following we will first analyze the SNS and DCS market structure from a micro-economic perspective and subsequently from a macro-economic view to show why SNSs probably tend to monopoly. Moreover, empirical evidence and examples for the monopoly hypothesis will be presented. However, first we will define the terms and concepts underlying the following analysis.

3.1 The Micro-Economic Perspective

As argued above, SNSs and DCSs in general constitute multi-sided platforms, generating revenue by brokerage of targeted advertising to its users for business partners (Nair, 2014). A closer view on the SNS structure reveals strong network effects between its users, because each additional user makes the network more attractive to other ones (Hui et al., 2006; Krasnova et al., 2010). In the case of SNSs this is simply because a broader user base enlarges the chance to find friends within the SNS, for search engines it is because each request helps algorithms to get more precise and thereby makes the service better for each user. Moreover, there are one-sided network effects between the advertisers and users, because each additional user makes the SNS respectively DCS more valuable and promising for the advertiser due to a broader audience for targeted advertisement. On the other side it can be assumed that users are more pleased to receive a broad range of advertisements instead of seeing the same advertisement again and again. However, there is no network effect between the different advertisers but the opposite is the case. While advertisers profit from additional SNS respectively DCS users and therefore often perform side-advertisement by promoting their company profiles in their preferred SNS in other media (e.g. advertising the company's Facebook-page or Twitter-account), they are rivals to other advertisers within the same DCS or SNS. More precisely, currently leading SNSs respectively DCSs auction targeted advertisement for specific audiences or keywords in a real-time bidding system between interested advertisers (Giacomo, 2013). Hence, while the network effects bind users to the SNS, advertisers are competitors for the service of targeted advertisement (see Figure 2).

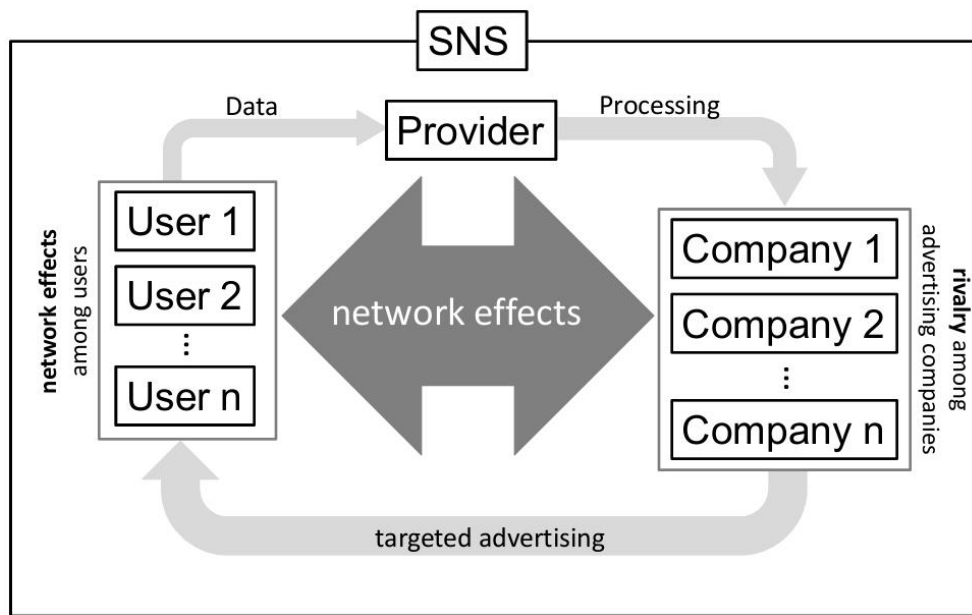


Figure 2 Relations within SNSs

Further, SNS users suffer from a lock-in-effect due to the described network-effects and the content they create within an SNS (Krasnova et al., 2010). This content is bound to the SNS infrastructure and hardly transferable to a SNS by another SNO. Thus, even if a competing SNO enters the market and users perceive the new SNS in general more attractive than the one they currently use, it is still unlikely that users will switch to the new SNS.

Nevertheless, advertisers can also face certain lock-in-effects in case they create company profiles in a SNS, thereby establishing connections to their customers and creating an audience network they do not want lose by switching to another SNS. However, it is in the interest of advertisers to promote those profiles parallel in different SNSs to reach as many users as possible. This reduces lock-in effects on the advertiser-side. Moreover, within most SNSs it is possible to run targeted advertisement without company profiles, which makes the profiles beneficial but not crucial for advertising success. Overall, the lock-in-effect can be considered much stronger on users-side than on the advertiser-side.

3.2 The macro-economic approach

Considering the SNS and DCS market structure from a macro-economic perspective it seems natural to use the theory of the feature of goods (Mankiw, 2004) to get a clearer view on the suspicion of quasi-monopolistic market dominance. As already stated in the previous section, advertising companies are in rivalry for the limited space for targeted advertisements while SNS respectively DCS users benefit from network-effects for every other user joining or using the service without being negatively affected by new users.²

Classifying this structure into a feature of goods table (see Table 1) it is quite obvious that the service of providing targeted advertisement inside SNSs or DCSs is to be considered a private good. The space for advertisement in DCSs and SNSs is limited and, thus, the good of advertisement is a rival one because all advertising companies compete for the same, limited space and it is excludable because one advertiser can clearly exclude each other through a higher bid for the same advertisement space. Further, a SNO respectively DCB can decide to

² With the exception of slower services if the SNO does not provide enough computing power.

exclude some advertiser from its service. Hence, the advertiser-sided usage of a DCS or SNS is a private good. Thus, in SNSs and DCSs there seems to be a strong rivalry between advertisers of the same category because if one's bid for an advertisement space for a specific keyword or audience group is too low the space goes to the direct competitor.

Categorizing the SNS and DCS service for the users-side is more complicated. We argued before that for most SNSs and DCSs it is the case (due to network-effects) that users profit from other users using the same service. Hence, participating in a SNS or using a DCS service is obviously non-rival because the usage prevents no one else from joining or using it. However, the question to be answered is whether the good of user-side SNS respectively DCS usage is excludable or not which makes the difference between a public good and club good. On the first glance, it seems intuitive to argue that using a DCS or SNS as a user is a public good because no one seems to be able to exclude someone else from using it. However, people from China trying to access Google in June 2014 or generally trying to use Facebook will disagree³. With instruments like IP-ban or simple account-blocking, for those SNSs which need a registration, it is possible for SNOs or governments to exclude certain individuals or whole regions. Hence, the SNS respectively DCS usage from user-side is non-rival but excludable and, thus, a club good.

Table 1 Feature of Goods Classification

	excludable	non-excludable
rival	<i>“private good”</i> targeted advertisement in SNSs/DCSs	<i>“common good”</i>
non-rival	<i>“club good”</i> SNS/DCS usage by users	<i>“public good”</i>

Besides non-rivalry and excludability, club goods have another characteristic, which fits well to user-side SNS respectively DCS usage: Low marginal costs. The costs to provide the SNS or DCS to an additional user is, after establishing a running system, marginal. This leads to rising returns of scale, which makes club goods ideal for natural monopolies (Mankiw, 2004). Taking the costs to set up a SNS or DCS by programming the services and establishing a broad user base as fixed cost, we find another hint for monopoly tendencies at DeLong, Bradford and Summers: “An industry with high fixed costs and near-zero variable costs has another important characteristic: it tends to monopoly” (DeLong and Summers, 2001, p. 49). Summarizing, splitting up the SNS respectively DCS market in targeted advertisement and user-sided usage, at least for the last one the preconditions to establish a monopoly are fully given.

3.3 Real world evidence

Considering the actual DCS market structure it is obvious that there are two dominant market players, one for the services of SNSs and one for Internet search engines. Google has currently a worldwide market share of over 88%, followed by Microsoft's Bing with a market

³ <http://www.zeit.de/politik/ausland/2014-06/china-tiananmen-jahrestag-google-sprerrung-festnahmen>

share of only 4% (StatCounter, 2015), which gives Google at least a quasi-monopolistic market dominance for the market of Internet search.

For the SNS market the picture is not that clear. For a clearer view, we stick to our SNS definition and consider only those SNOs, which aim for a global market. We take the statistic of current global social networks ranked by number of users in 2015 (We Are Social, 2015) and cut out those SNSs that do not fit into our definition, e.g. those that only provide one service like messaging or picture sharing, or those who are only active on a national market (see Table 2). The result is that Facebook with over 1.415 million users (even without counting in the 700 million users of WhatsApp⁴) by far dominates the market. Moreover, the second largest SNS is LinkedIn with 377 million users, which is only about a forth of the user base of Facebook. However, LinkedIn aims only for professionals acting as professional social network service (PNS) and, thus, is no direct competitor on users-side for Facebook, because it is possible and common for users to maintain profiles in both services. Hence, the strongest direct competitor for the market leader Facebook is Google+ with only 300 million users, which is only 21% of Facebook's user base. Overall, Facebook clearly has a dominant position in the SNS market but it is hard to argue whether it takes a quasi-monopolistic position, because it is possible for users to have parallel profiles in different SNSs. Nevertheless, 48% of the Internet users have a Facebook account, which is an impressive market share of the SNS (Internet Live Stats, 2014; We Are Social, 2015).

Table 2 User numbers of current SNS

Social Network	Number of active users (in millions)
Facebook	1.415
LinkedIn	347
Google+	300
Twitter	288
Tumblr	230

Historically seen, currently dominating DCBs all followed similar strategies. After establishing a critical user base and thereby a leading market position, the SNOs started to commercialize their network by analyzing disclosed user data to enable targeted advertisement and attract advertisers. Following our argumentation from Section 3.2, the incentive to focus on attracting users becomes weaker for a SNO after reaching a critical mass of users. Due to network and lock-in effects, new users sign in and stay in simply because of SNS popularity and size. Hence, within our presupposition it seems rational for established SNOs to focus mainly on attracting advertisers.

Our assumption is that the relations described in Sections 3.2 and 3.3 result in a more and more advertiser-oriented market structure. The current numbers and the development of the net digital advertising revenue share for the major worldwide ad-selling companies indicate that the advertisement market is much more divided and embattled than the different SNS niches (We Are Social, 2015). Advertisers are not as bound to a specific SNS as users are (see

⁴ WhatsApp was bought by Facebook in 2014.

Section 3.1). Hence, advertisers split their marketing budget for online advertisement between different SNSs and other online services. While Google has a market share for online search engines of 88%, its share of the net digital advertising revenue is only 31%, followed by Facebook with a share of nearly 8% and the Chinese online search engine Baidu with nearly 5% market share (StatCounter, 2015). Thus, while SNSs dominate each their niche market on users-side they are competing for the same advertising customers. Hence, SNOs have the incentive to make their targeted advertisement as precise as possible and thereby become more attractive for advertising companies. Therefore, SNOs rely on users to reveal as much data as possible to be able to calculate more precise profiles. This indicates that end user privacy suffers from the SNS user-sided quasi-monopoly and the competition for advertising customers. Findings that SNOs use different mechanisms to push users to disclose, starting from including a broad variety of different services into their portfolio (e.g., gaming features), over general non-privacy-by-default options, up to privacy policies and interface changes (Stutzman et al., 2013) support this assumption.

3.4 Limitations

The used macro- and micro-economic models are subject to certain restrictions. First, while the user-sided network effects in the micro-economic modeling are surely existent in SNSs, it is not clearly the case that in DCSs. For example, for Internet search engines, every new user or usage brings an advantage for the whole user community. It can be assumed that there is declining marginal benefit for each new user while the algorithms of the DCS are getting optimized up to a point from where on the algorithm can not get any better from wider-ranging usage. Further, for the macro-economic modeling, the excludeability can be bypassed by users via Tor or other IP-hiding tools. Hence, for those who are technical experienced, SNS and DCS usage becomes a public good instead of a club good and it is, thus, less convenient to construct a user-sided monopoly.

4. Towards a multi-disciplinary research agenda

As argued above there are reasons to assume that the current SNS market structure leads to SNOs pushing users to disclose more data to optimize their targeted advertising services and, thus, attract more advertising customers. This could be a disadvantage or even a threat to users' privacy. To answer the question whether users' privacy is threatened by the current SNS market structures and how this situation can be solved, we will outline a multi-disciplinary research agenda towards further investigation of the interrelation of the SNS market structure and SNS privacy problems. To target the problem sufficiently, not only an economic approach, but also a computer science and a legal approach is needed.

The basis for the economic analysis is given by the hypothesis that personal data acts as a payment method within SNSs (Nolte, 2015). This requirement enables us to map the trade-off of giving up privacy to use SNSs in a behavioristic utility model for SNS users in a next step. Combined with a microeconomic analysis of the inner SNS structure it should help us to understand more clearly whether users are willingly giving up privacy to use more functionalities of SNSs as some researches suggest (Acquisti, 2014), or whether users are tricked or trapped and, thus, forced to disclose personal data against their will and preferences as others indicate (Nolte, 2015). The latter would be an indicator for the assumption that SNSs use their user-sided dominance or even monopoly to demand monopoly prices in terms of personal data disclosure and use from its users. This analysis should itself be verified by a detailed analysis of SNSs as multi-sided platform, general examining if one side, either the users or the advertisers, is overpriced or subsidized by the SNO. Moreover, particularly the

assumption that the quasi-monopoly of Google led to webpages being search engine optimized only for the Google search algorithm and thereby strengthening or even enlarging Google's market dominance is worth a consideration. Additionally, an analysis if the classical monopoly definitions fit to the Internet market or should be adapted is needed to underlay the whole economical research agenda.

Further, if our analysis shows that current dominant SNSs and DCSs have a monopoly and use it to overprice users and by that threaten their privacy, the next step is to find out how to set incentives to the market to counteract such behavior. Key factors, which likely make users the weak side of the multi-sided SNS respectively DCS market and therefore probably the overpriced side, are highly likely lock-in-effects and network-effects. Hence, in a last step of the economic analysis, market incentives and technical instruments to ease those effects and thereby enlarge the user-sided competition for SNSs and DCSs in the market have to be considered.

Subsequently, an analysis of the existing SNS respectively DCS market structure and privacy legislation is necessary. The goal of this analysis is to verify, on the basis of the afore constructed economic models, whether the current legislation on national, European and eventually global level is sufficient and, if not, which changes are needed to implement the aforementioned market incentives and technical instruments to enlarge user-sided competition for SNSs respectively DCSs within the market structure and to adequately protect users' privacy.

Table 3 Research Agenda

Multi-disciplinary research agenda				
Steps	Economics	Computer and IS	Science	Jurisprudence
1	Behavioristic utility model for SNS/DCS users & microeconomic analysis of the inner SNS structure			Analysis of the implications of the GDPR's moveability principle.
2	Pricing analysis of SNSs/DCSs as multi-sided platform			
3	Analysis if the classical monopoly definitions fit the Internet market			
4	Analysis of economic incentives that counter privacy undermining effects.	Investigation of the suitability of existing technical instruments to support competition		

The final goal is to derive a comprehensive answer to the question if the SNS and DCS market structure is undermining users' privacy and if the current market mechanisms and laws are sufficient to lead a way out of this possible disadvantage situation.

5. Conclusion and Outlook

In this paper we showed by economic analysis that Social Networks Services (SNSs) and other Data Centric Services (DCSs) contain by their structure the tendency for user-sided monopolies. Strong network effects as well as lock-in effects for users in combination with the result that service usage as a user is non-rival but excludable and, thus, a club good were identified as sufficient requirements for providers to develop a monopoly or at least a dominant market position (see Sections 3.1 and 3.2). Further, we showed with current data that in the market of Internet search engines Google has an at least quasi-monopolistic position. Moreover, in the market of SNSs Facebook is in a dominant position with over four times more active user than its closest competitor. Nevertheless, on the SNS and DCS market side for targeted advertisement, Google, Facebook and others are rivals for the same advertising companies. Also, in the advertisement market Google is in a leading position but far away from having a monopoly. Further, other competitors, also offering targeted advertisement (e.g. Facebook), are on the rise and claim slightly more and more of the market share (eMarketer, 2015). Building on this economic analysis and the results of other research, that revealed that users often disclose more personal data than they are intended to do while using SNSs (Hull, et al., 2011; Netter, et al., 2013; Nolte, 2015; Stutzman et al., 2013), we draw our hypothesis that the SNS and DCS market structure may lead to users being disadvantaged regarding their privacy preferences or even overpriced in terms of private data as payment for SNSs and DCSs. Overpricing the side which is stronger bound to the service provider is a tendency that is known from other, classical multi-sided platforms (Kaiser and Wright, 2006).

Therefore, we draw out a multi-disciplinary research agenda to go further into the question if users are disadvantaged or even discriminated in terms of overpricing in the SNS and DCS market structure. This research agenda contains economic, as well as computer science and law approaches to clear the question whether the former is the case and how incentives can be established to encourage competition and thereby counteract privacy-undermining behavior of providers. We divided the research agenda in five steps, including an underlying economic analysis to model user behavior as well as the inner SNS and DCS structures and effects, and analysis of providers' pricing behavior compared to classical markets.

The computer science and information systems part of the research agenda aims at the investigation of the suitability of currently available technological instruments to enable privacy-friendliness to become a competitive factor. This includes investigation of Transparency-Enhancing Technologies and accountability mechanisms (Zimmermann and Cabinakova, 2015) as well as of instruments for increasing moveability between DCSs respectively SNSs.

Additionally, an analysis of current legislation on national and European level is to be performed to determine whether the current laws protect privacy sufficiently in all market structures.

6. Bibliography

Acquisti, A. (2014). *The Economics and Behavioral Economics of Privacy*. In *Privacy, Big Data, and the Public Good - Frameworks for Engagement*, (New York, NY, USA: Cambridge University Press), pp. 76–95.

Acquisti, A., and Gross, R. (2006). *Imagined Communities: Awareness, Information Sharing, and Privacy on the Facebook*. In *Privacy Enhancing Technologies*, (Springer Berlin / Heidelberg), pp. 36–58.

Armstrong, M. (2006). Competition in two-sided markets. *The RAND Journal of Economics* 37, 668–691.

Bork, R.H., and Sidak, J.G. (2012). What does the Chicago school teach about Internet search and the antitrust treatment of Google? *Journal of Competition Law and Economics* 8, 663–700.

Boyd, D. M., Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication* 13 (1), 210–230.

Buchmann, Johannes. *Internet Privacy*. Springer-Verlag, 2012

DeLong, J.B., and Summers, L.H. (2001). The 'new economy': background, historical perspective, questions, and speculations. *Economic Review-Federal Reserve Bank of Kansas City* 86, 29.

eMarketer Net digital advertising revenue share of major ad-selling online companies worldwide from 2012 to 2014 (<http://www.statista.com/statistics/290629/digital-ad-revenue-share-of-major-ad-selling-companies-worldwide/>, last accessed 2015/07/15)

Enders, A., Hungenberg, H., Denker, H.-P., and Mauch, S. (2008). The long tail of social networking.: Revenue models of social networking sites. *European Management Journal* 26, 199–211.

Evans, D.S., and Schmalensee, R. (2013). The Antitrust Analysis of Multi-Sided Platform Businesses (National Bureau of Economic Research) (<http://www.nber.org/papers/w11603>, last accessed 2015/07/15)

Giacomo, L. (2013). Is the Google Platform a Two-Sided Market? *Mercato Concorrenza Regole* 83–118.

Hagiu, A., and Wright, J. (2011). Multi-sided platforms (Harvard Business School) (<http://hbswk.hbs.edu/item/6681.html>, last accessed 2015/07/10)

Haucap, J., and Kehder, C. (2013). Suchmaschinen zwischen Wettbewerb und Monopol: Der Fall Google, Juni 2013. Erschienen in: R. Dewenter, J. Haucap & C. Kehder (Hrsg.), *Wettbewerb Und Regulierung in Medien, Politik Und Märkten: Festschrift Für Jörn Kruse Zum 65*, 115–154.

Haucap, J., and Kehder, C. (2014). Marktdominanz von Google, Amazon und Co.: Diktieren die Internetfirmen die Regeln? *Ifo Schnelldienst* 67, 03–14.

Hui, K.-L., Tan, B.C.Y., and Goh, C.-Y. (2006). Online Information Disclosure: Motivators and Measurements. *ACM Trans. Internet Technol.* 6, 415–441.

Hull, G., Lipford, H.R., and Latulipe, C. (2011). Contextual gaps: Privacy issues on Facebook. *Ethics and Information Technology* 13, 289–302.

Internet Live Stats (2014). Internet users in the world (<http://www.internetlivestats.com/internet-users/>, last accessed 2015/07/15)

Kaiser, U., and Wright, J. (2006). Price structure in two-sided markets: Evidence from the magazine industry. *International Journal of Industrial Organization* 24, 1–28.

Kosinski, M., Stillwell, D., and Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *PNAS* 110, 5802–5805.

Krasnova, H., Spiekermann, S., Koroleva, K., and Hildebrand, T. (2010). Online social networks: why we disclose. *J Inf Technol* 25, 109–125.

Kühling, J., and Gauß, N. (2007). Expansionslust von Google als Herausforderung für das Kartellrecht. *Multimedia Und Recht: MMR* 10, 751–757.

Mankiw, N.G. (2004). *Grundzüge der Volkswirtschaftslehre* (Schäffer-Poeschel Verlag Stuttgart).

Müller, G., Flender, C., and Peters, M. (2012). Vertrauensinfrastruktur und Privatheit als ökonomische Fragestellung. In *Internet Privacy* (Springer Berlin Heidelberg), pp. 143–188.

Nair (2014). Must-know: Assessing Facebook's revenue sources (<http://finance.yahoo.com/news/must-know-assessing-facebook-revenue-170009607.html>, last accessed 2015/07/14)

Netter, M., Riesner, M., Weber, M., and Pernul, G. (2013). Privacy Settings in Online Social Networks – Preferences, Perception, and Reality. In 2013 46th Hawaii International Conference on System Sciences (HICSS), pp. 3219–3228.

Nolte, C.-G. (2015). Personal Data as Payment Method in SNS and Users' concerning Price Sensitivity - A Survey. In To Appear in *Lecture Notes in Business Information Processing, LNBIP 228* (Springer), (to appear).

Pennacchiotti, M., and Popescu, A.-M. (2011). Democrats, republicans and starbucks aficionados: user classification in twitter. In *Proceedings of the 17th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, (ACM), pp. 430–438.

Rochet, J.-C., and Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the European Economic Association* 990–1029.

StatCounter (2015). Worldwide market share of leading search engines from January 2010 to April 2015 (<http://www.statista.com/statistics/216573/worldwide-market-share-of-search-engines/>, last accessed 2015/07/08)

Stutzman, F., Gross, R., and Acquisti, A. (2013). Silent Listeners: The Evolution of Privacy and Disclosure on Facebook. *Journal of Privacy and Confidentiality* 4, 7–41.

We Are Social, I.S. (2015). Leading Social Networks Worldwide as of March 2015, Ranked by Number of Active Users (in Millions). (<http://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>, last accessed 2015/07/12)

Westin, A. (1967). *Privacy and Freedom* (New York, USA: Atheneum).

Westin, A.F. (2003). Social and Political Dimensions of Privacy. *Journal of Social Issues* 59, 431–453.

Zimmermann, C., and Cabinakova, J. (2015). A Conceptualization of Accountability as a Privacy Principle. In *Business Information Systems Workshops, LNBIP 228* (Springer), (to appear).

